

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-292522

(43)Date of publication of application : 20.10.2000

(51)Int.Cl.

G01S 5/14

H01Q 1/12

H01Q 1/27

(21)Application number : 11-104436

(71)Applicant : JAPAN RADIO CO LTD

(22)Date of filing : 12.04.1999

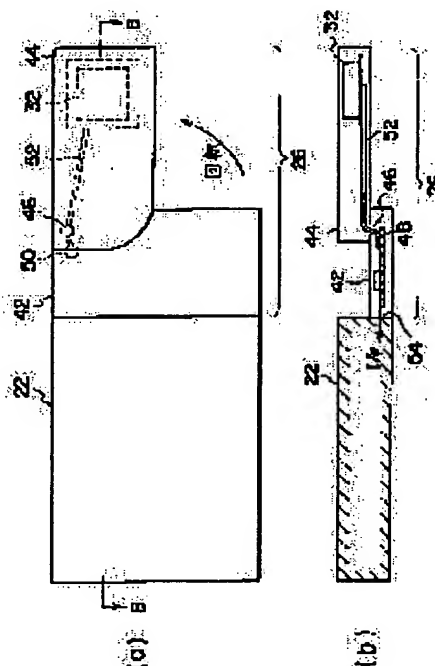
(72)Inventor : NISHIJIMA MOTOJI  
OKUYAMA AKIRA  
TAMURA KIYOSHI

## (54) POSITIONING CARD

## (57)Abstract:

PROBLEM TO BE SOLVED: To integrate an antenna used for receiving satellite signals with a card inserted and loaded into information equipment.

SOLUTION: An antenna housing section 22 is attached to a GPS card, which is inserted and loaded into a PDA (personal digital assistance) 22, etc., when the card is used, in such a way that the section 44 can be turned around a rotating shaft 46 against a circuit housing section 42 and a GPS antenna 32 is arranged in the housing section 44. Since the distance from the card slot of the PDA 22 to the antenna 32 can be prolonged, the possibility of the reception of satellite signals by means of the antenna being disturbed by the radiation from a CPU, etc., incorporated in the PDA 22 is reduced. It is also possible to direct low-gain receiving direction toward the depth direction of the card slot by inclining the antenna 32 against the depth direction of the card slot.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's]

**THIS PAGE BLANK (USPTO)**

---

## CLAIMS

---

[Claim(s)]

[Claim 1] The receiver stowage which contains the circuit of the receiver which generates navigation data based on the antenna and this satellite signal for carrying out wireless reception of the satellite signal from a positioning satellite, It has the interface section which is the connecting means of the circuit of a receiver, and information machines and equipment, and has the shape of a card type in which insertion wearing is possible in the card slot of the information machines and equipment concerned. A receiver stowage It is divided into the antenna stowage which contains an antenna, and the circuit stowage which contains the circuit of a receiver. The interface section, a circuit stowage, and an antenna stowage So that the wireless travelling distance from a card slot to an antenna may be changed, where insertion wearing of the interface section is carried out at a card slot It is the positioning card which is connected mutually and characterized by the circuit of an antenna and a receiver being mutually connected electrically by the conductive member passing through the opening part established in the part concerning the link concerned, or its near.

[Claim 2] It is the box-like part in which the circuit stowage was established in the end of the interface section fixed in the positioning card according to claim 1. An antenna stowage is the box-like part which can circle to a circuit stowage centering on a connection part with a circuit stowage. When insertion wearing of the interface section is carried out at a card slot and the angular position of an antenna stowage is further made into the angular position by which an antenna approaches a card slot most The positioning card characterized by preparing a circuit stowage and an antenna stowage so that the appearance of a receiver stowage may serve as a rectangular parallelepiped of thickness almost equal to the thickness of the above-mentioned information machines and equipment.

[Claim 3] The positioning card characterized by the arc of the turn of an antenna stowage being almost parallel to the depth direction of a card slot, and each of circuit stowages and antenna stowages having a tabular appearance in a positioning card according to claim 2.

[Claim 4] The receiver stowage which contains the circuit of the receiver which generates navigation data based on the antenna and this satellite signal for carrying out wireless reception of the satellite signal from a positioning satellite, It has the

interface section which is the connecting means of the circuit of a receiver, and information machines and equipment, and has the shape of a card type in which insertion wearing is possible in the card slot of the information machines and equipment concerned. It is designed so that an antenna may present receiving gain high about a predetermined direction and receiving gain low about other predetermined directions may be presented. The positioning card characterized by having arranged the antenna in a receiver stowage so that the low interest profit receive direction of an antenna may turn to the direction of a card slot, when insertion wearing of the interface section is carried out at a card slot.

[Claim 5] the positioning card characterize by having arrange the antenna in a receiver stowage so that the above-mentioned information machines and equipment be devices use after having been grasp by the user , and the high interest profit receive direction may turn to a heavens in a positioning card according to claim 4 , while carry out insertion wearing of the interface section at a card slot and use the above-mentioned information machines and equipment with the standard use posture further .

[Claim 6] The positioning card with which the camera for photoing a perimeter is characterized by what was contained by the camera stowage which constitutes a receiver stowage in a positioning card according to claim 1 to 5.

[Claim 7] The positioning card characterized by preparing a camera stowage free [ rotation ] in a positioning card according to claim 6 to the antenna stowage or circuit stowage which constitutes a receiver stowage or this.

[Claim 8] The positioning card characterized by for the circuit of a receiver making information, such as the name of a place drawn from the positioning result or the positioning result concerned, add or superimpose on the photography result slack image data based on a camera, and outputting to information machines and equipment in a positioning card according to claim 6 or 7.

[Claim 9] The information about the name of a place which should be made to correspond to the LAT LONG and the LAT LONG concerned of the present location obtained as a positioning result in a positioning card according to claim 8 It is made to memorize by the storage member which it is exchangeable and is accessed by the circuit of a receiver. insert and remove — in the circuit of a receiver The positioning card characterized by performing conversion to the name of a place from LAT LONG by referring to the contents of storage of this storage member, and adding or superimposing on the photography result slack image data based on a camera.

---

## DETAILED DESCRIPTION

---

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the positioning equipment used for card slots, such as a PC Card slot of PCMCIA (Personal Computer Memory Card International Association) specification conformity prepared in the personal computer, the Personal Digital Assistant (PDA), etc., and a CompactFlash (CF) slot, by carrying out insertion wearing, i.e., a positioning card.

[0002]

[Description of the Prior Art] In GPS (Global Positioning System), wireless transmission of the satellite signal is carried out from the positioning satellite on an orbit around the earth, i.e., a GPS Satellite, this is received in a terrestrial GPS receiver, it asks for a present location (LAT LONG), current time, passing speed, etc. based on the result, and the result is outputted as navigation data at a GPS receiver. The GPS card which is a kind of a positioning card carries a card interface in a GPS receiver, and makes the configuration the shape of a card, and can be made to carry out insertion wearing at card slots, such as PCMCIA. By using this, navigation data can be incorporated to information machines and equipment, such as a personal computer, through a card interface. If it says in the example which uses a GPS card with a mounted personal computer, this navigation data is applicable to cooperation with automatic selection of the map which should be displayed on a screen, the voice guidance about the destination, or the famous place and a tourist resort, etc., and various kinds of other processings.

[0003] An example of the GPS card in the former is shown in drawing 14 . The GPS card 10 in which insertion wearing to PC Card slot 14 of PCMCIA conformity of a personal computer 12 is possible is known from the former as shown in this drawing. However, the GPS card 10 in the former is a configuration which makes outside attachment connection of the GPS antenna 16 with an antenna cable 18. The GPS antenna 16 is set on the shoulder of the location which can receive the satellite signal from a GPS Satellite, for example, the roof of a car, (when using it by the mounted device), and a user etc. (when human being under outdoor walk uses it).

[0004]

[Problem(s) to be Solved by the Invention] Since one of the problems of the GPS card in the former is a configuration which carries out external [ of the GPS antenna ] to a GPS card with an antenna cable, it is that a user has to treat two

bodies called the GPS antenna by which the GPS card is connected to the information machines and equipment and this by which insertion wearing is carried out with the antenna cable. For example, it may be used with the gestalt that PDA (personal digital assistants) which a user grasps and uses, the mobile computer which a user carries and uses for a palm use one hand in order that the information machines and equipment of a pocket mold may grasp or support the information machines and equipment, and it operates a keyboard, a touch panel, a pointing device, etc. by the hand of another side. Since both hands are closed and it cannot have a GPS antenna in a hand in order to use a GPS card in that case, it must carry out carrying a GPS antenna etc. to other locations, for example, its shoulder, and a good receive state must be secured. In this case, moreover, a user has to operate information machines and equipment correctly, paying attention for making it not drop a GPS antenna from a shoulder, and taking about an antenna cable so that it may not become the trouble of actuation. After all, a burden is placed on a user also in respect of being mental also in respect of operability.

[0005] As one of the ways of thinking for solving this problem, a GPS card and a GPS antenna are incorporated in one case, and there is the way of thinking of abolishing the antenna cable for carrying out external [ of the GPS antenna ] to a GPS card. If this way of thinking is realizable, the burden in the field and the mental field of the operability given to a user is mitigated, and miniaturization and miniaturization by unification, cheap-ization by components mark reduction, etc. can be realized further. In addition, development of the miniaturization technology of a GPS antenna is progressing at least in the applicant for this patent, and a small GPS antenna incorporable into the body of a GPS card can also be realized. However, a satellite signal is unreceivable by having incorporated the GPS card and the GPS antenna in one case simply good in fact with a GPS antenna.

[0006] First, since the satellite signal from a GPS Satellite is a signal spread from an orbit around the earth to the ground, receiving reinforcement is low and it has been buried in the noise again. On the other hand, electronic parts and electronic circuitries, such as CPU which generally operates according to the clock of dozens – about 100MHz of numbers, are got blocked in the interior of the information machines and equipment with which insertion wearing of the GPS card is carried out (the clock of a higher frequency will also be used in the future). Since components and circuits, such as CPU, carry out wireless radiation of an electrical signal thru/or the noise with a clock twice [ natural number ] the frequency of this, the comparatively strong radiation by CPU etc. generates even the frequency band

(about (L1) 1.6GHz or about (L2) 1.2GHz) currently used for conveyance of the satellite signal from a GPS Satellite. Although based also on the arrangement design of CPU etc., when radiation of CPU [ / near the carrier frequency of a satellite signal ] etc. is measured near the surface opening of a card slot, compared with a satellite signal, about about 30-40dB is understood that it is high level. Therefore, when a GPS antenna is united with the body of a GPS card, the radiation from still more powerful CPU etc. will hang on the satellite signal which is a signal weakly buried in the noise from the first, and suitable generation of the navigation data in suitable \*\*\*, as a result the GPS card of a satellite signal by the GPS antenna is doubtful absolutely. Therefore, as conventionally shown in drawing 15 , external [ of the GPS antenna 16 ] is carried out using an antenna cable 18, and the distance from the card slot 14 to the GPS antenna 16 is lengthened, and it is made to make low receiving reinforcement of the radiation from CPU in the GPS antenna 16 etc. by it.

[0007] This invention is made considering solving such a trouble as a technical problem, and sets to unite an antenna with a receiver, and to offer the effective cure means against the radiation from the interior of insertion wearing place information machines and equipment that this should be realized to one of the purpose of the.

[0008]

[Means for Solving the Problem] That such a purpose should be attained, in this invention, it has devised in the arrangement gestalt and inclusion gestalt of an antenna so that the radiation from the interior of insertion wearing place information machines and equipment may not be received as much as possible. The operation gestalt of this invention can be divided into the gestalt of an antenna rotation mold, and the gestalt of an antenna inclination mold by the method of this device.

[0009] First, the positioning card (it becomes a GPS card when using GPS as a positioning system) concerning this invention is equipped with a receiver stowage and the interface section also with an antenna rotation mold or an antenna inclination mold. A receiver stowage contains the antenna for carrying out wireless reception of the satellite signal from a positioning satellite, and the circuit of the receiver which generates navigation data based on this satellite signal. The interface section is the connecting means of the circuit of a receiver, and information machines and equipment, and has the shape of a card type in which insertion wearing is possible in the card slot of the information machines and equipment concerned. As an example of the interface section, the thing of PCMCIA conformity

and a thing compatible with CF can be mentioned.

[0010] In the case of an antenna rotation mold, a receiver stowage is divided into the antenna stowage which contains an antenna, and the circuit stowage which contains the circuit of a receiver. Furthermore, the interface section, a circuit stowage, and an antenna stowage are made to connect mutually where insertion wearing of the interface section is carried out at a card slot so that the wireless travelling distance from a card slot to an antenna may be changed, namely, so that the wireless travelling distance concerned can be enlarged if needed. The circuit of an antenna and a receiver is electrically connected by the conductive member passing through the opening part established in the part concerning the link concerned, or its near.

[0011] In the case of an antenna inclination mold, the connection structure for not dividing a receiver stowage into an antenna stowage and a circuit stowage, and enlarging wireless travelling distance from a card slot to an antenna if needed is not required, either. In the case of an antenna inclination mold, when insertion wearing of the interface section is carried out at a card slot, an antenna is arranged in a receiver stowage so that the low interest profit receive direction of an antenna may turn to the direction of a card slot. In addition, the antenna shall be designed so that receiving gain high about a predetermined direction may be presented and receiving gain low about other predetermined directions may be presented. Furthermore, a setup of the low interest profit receive direction of an antenna etc. can be performed by setup of the receipt arrangement include angle of the antenna to the card slot depth direction. However, the configuration of an antenna inclination mold is not restricted to mechanical "inclination" called such antenna arrangement, and can be realized also on the "inclination" on the electronics control which leans the directivity of an antenna by array-izing and phase shift processing of a component antenna.

[0012] Therefore, in an antenna rotation mold, since the direction of a card slot is the direction of low receiving gain in an antenna inclination mold by lengthening wireless travelling distance from a card slot to an antenna again, all can prevent thru/or mitigate the radio disturbance of the satellite signal by the radiation from the interior of information machines and equipment. Consequently, the frequency where a satellite signal is suitably receivable improves, and the time amount which cannot be positioned becomes short, therefore an average duration after ordering it positioning to a positioning card until a positioning result is obtained becomes short. Moreover, as a result of the cable of \*\* with the outside of an antenna becoming



unnecessary, components mark become fewer, it becomes cheap, and handling becomes easy. Furthermore, as a result of being unified in the form which both a receiver and an antenna are contained in a receiver stowage, or is connected mutually, an equipment configuration becomes compact and the positioning card suitable for the equipment with which portability, such as PDA, is demanded is obtained.

[0013] Furthermore, there is a gestalt which prepares a circuit stowage slack box-like part in the end of the interface section fixed as a desirable gestalt of an antenna rotation mold, and prepares an antenna stowage slack box-like part so that it may be revolved to a circuit stowage centering on a connection part with a circuit stowage. With this gestalt, by the appearance of a circuit stowage and an antenna stowage, and the design of a dimension, it is compact and the configuration in which an antenna stowage does not protrude at the time of un-using it can be realized. When insertion wearing of the interface section is carried out at a card slot and the angular position of an antenna stowage is specifically further made into the angular position by which an antenna approaches a card slot most, a circuit stowage and an antenna stowage are prepared so that the appearance of a receiver stowage may serve as a rectangular parallelepiped of thickness almost equal to the thickness of the above-mentioned information machines and equipment. In this case, in the arc of the turn of an antenna stowage, almost parallel to the depth direction of a card slot, then when it can make each of circuit stowages and antenna stowages into a tabular appearance and a plate-like antenna and the plate-like circuit board are contained to that interior, it is convenient.

[0014] Moreover, while carrying out insertion wearing of the interface section at a card slot and using the information machines and equipment of an insertion wearing place with the standard use posture further in the antenna inclination mold, it is desirable, when the information machines and equipment of an insertion wearing place are the device which a user uses, grasping, for example, PDA, to arrange an antenna so that the high interest profit receive direction may turn to heavens. A standard use posture here means the condition of operating it, looking at the display screen which grasps or supports information machines and equipment, and is generally established in the front face. thus, if it carries out, the effectiveness of mitigation and prevention of the effect of radiation from the interior of information machines and equipment, simultaneously better reception of a satellite signal will be acquired.

[0015] Furthermore, functions other than a positioning function can also be added to

the positioning card concerning this invention. For example, the camera for photoing a perimeter is contained to the camera stowage which constitutes a receiver stowage. By this, it becomes possible to photo the situation near the point which measured the its present location etc., and it becomes convenient for a user. Moreover, it also becomes saving resources, as a result of a positioning card and a camera card not needing to be substituted, either, but mitigating troublesomeness and common-use-izing the interface section etc., when using a positioning card and a camera card together. Furthermore, the actuation at the time of deciding bearing of the exposure axis becomes simple by preparing a camera stowage free [ rotation ] to the antenna stowage or circuit stowage which constitutes a receiver stowage or this.

[0016] Moreover, you can make it cooperate with the positioning function in which the photography function offered with a camera is offered by the antenna and the receiver. For example, when photography result slack image data are obtained with a camera, the circuit of a receiver makes information, such as the name of a place drawn from positioning results (LAT LONG of the photography ground, photography time of day, etc.), or the positioning result concerned, add or (for example, header-izing) superimpose on this image data (for example, image composition), and it is made to output to information machines and equipment. In case the activity which arranges an image or image data will be done from the header or the image itself of image data after being able to know the photography ground and photography time of day and leaving photography for a while if it does in this way, it becomes unnecessary to depend on storage and is convenient.

[0017] If above-mentioned automatic recording is especially performed not in LAT LONG but in the name of a place, it will become concordance and cone equipment more for a user unfamiliar to a positioning system use. Moreover, the information which matches, information, i.e., both, required for the conversion to the name of a place from the LAT LONG of a positioning result slack present location insert and remove, if it is made to memorize, exchangeable memory, for example, memory stick, and the circuit of a receiver enables it to access this Since it becomes possible to exchange and use this storage member if needed The effectiveness of it not being necessary to prepare the mass-memory-unit material for the storage of the information with correspondence concerned which can change the information with correspondence concerned with the migration which can update easily the with information corresponding to a LAT LONG airraid name with name of a place display modification etc. in a positioning card etc. can be acquired.

[0018]

[Embodiment of the Invention] Hereafter, the suitable operation gestalt of this invention is explained based on a drawing. In addition, the same sign is given to the configuration which corresponds between operation gestalten, and the overlapping explanation is omitted in it. Moreover, although the GPS card by which insertion wearing is carried out is made into an example in the following explanation at CF slot of PDA, this invention can also carry those for information machines and equipment other than PDA out, as long as it has the card slot, it can be carried [ for / other than CF / interfaces (for example, for PCMCIA), or ] out, and as long as the satellite signal from a positioning satellite needs to be received further, those for positioning systems other than GPS can also carry it out.

[0019] The configuration of the GPS card applied to the 1st operation gestalt of this invention at drawing 1 is shown. The GPS card 20 shown in this drawing should use it for the card slot 24 of PDA22, carrying out insertion wearing, and consists of a receiver stowage 26 and the interface section 28. Although the interface section 28 has the card-like appearance in the card slot 24 so that insertion wearing can be carried out, and not illustrated, various kinds of circuits thru/or terminals shall be prepared in the interior and exterior so that the circuit in the receiver stowage 26 and the circuit in PDA22 may be electrically connected to a card slot 24, when insertion wearing is carried out. A card slot 24 and the interface section 28 constitute CF conformity thru/or a compatible interface here.

[0020] the GPS card 20 — it is in the condition which carried out insertion wearing of the interface section 28 at the card slot 24, and switched on the power source of PDA22 strictly, and if it positions using the GPS receiver contained by the receiver stowage 26, the navigation data in which the LAT LONG of the present location of PDA22, current time, passing speed, etc. are shown will be obtained. PDA22 performs various kinds of processings based on the navigation data which incorporated and incorporated this navigation data through the above-mentioned interface.

[0021] For example, the condition of displaying the map on the screen of the displays 30, such as liquid crystal prepared in the front face of PDA22, is considered as shown in drawing 2 (a). Processing to which a map is displayed on the screen of a display 30 can be performed based on the map information acquired from the exterior through connection with communication equipment, such as PHS which is not illustrated, based on the map information memorized with the storage and the storage element in PDA22. If navigation data are inputted from the GPS card 20, as

shown in drawing 2 (b), the symbol (the example of illustration black dot) which shows the present location given with navigation data will be displayed in a map and the piled-up form at PDA22. Such a use gestalt is adopted on the occasion of the so-called activation of walking along the outdoors and receiving the navigation by PDA22, and war KINGUNABI, carrying PDA22.

[0022] There are other various processings among the processings which may be performed to a card slot 24 by PDA22 where insertion wearing of the GPS card 20 is carried out. For example, processing which changes the map displayed according to change of a its present location, processing which changes the display scale factor of a map according to change of a current value, The processing which performs call origination to the information or the exterior to a user when the time of reaching the processing and the specific point on which the migration locus which shows change of the present location in the past is displayed, and specific time of day come, It is dependent on the design of the software performed by CPU in PDA22 etc., and navigation data can be used variously.

[0023] The GPS card 20 has circuitry as shown in an outline and drawing 3 . Among drawing, the GPS antenna 32 is an antenna for receiving the satellite signal by which wireless transmission was carried out from the GPS Satellite, for example, a microstrip type antenna can realize it. Processing which establishes the synchronization with the satellite signal received by the GPS antenna 32, takes out information, such as transmitting time of day, a pseudo range, and a Doppler shift, from the satellite signal, and derives navigation data by the geometric operation based on well-known logic is performed by ASIC (application specific integrated circuit)34. ASIC34 uses the memory 36 realized in various kinds of RAM and ROMs on the occasion of this processing. ASIC34 outputs the obtained navigation data to the PDA22 side through an interface 38. The processing in ASIC34 is controlled by the signal given from PDA22 through an interface 38 again, or receives a command. That is, the generation output of navigation data is controllable from the application software carried in PDA22.

[0024] Furthermore, current supply to each circuit thru/or component in the GPS card 20 including ASIC34 is performed from the PDA22 side through an interface 38. However, it is desirable to form the accumulation-of-electricity component 40 which is the rechargeable battery or capacitor charged with the power supplied from the PDA22 side also in the GPS card 20, and to enable it to perform current supply also from the accumulation-of-electricity component 40 to each circuit thru/or component in the GPS card 20. The processings which are useful to improvement

and power-saving of the usability of PDA22, such as supplying a power source to ASIC34 grade by activation of the application software in such a configuration, then PDA22, only when navigation data are required, and performing power-source management which restricts charge timing so that the charge condition of the accumulation-of-electricity component 40 may be maintained beyond a predetermined level, and preventing consumption of the internal electrical power source (cell) of PDA22 accompanying the charge to the accumulation-of-electricity component 40, can perform.

[0025] Among the circuits shown in drawing 3 , interfaces 38 are the internal circuitry, internal wiring, and the outside structure of the interface section 28, and the remaining circuit is contained inside the receiver stowage 26 shown in drawing 1 . One of the descriptions of this operation gestalt is that the GPS antenna 32 connected to the part of the shape of a card of the GPS card 20, i.e., the end of the interface section 28, at ASIC34 which is the central circuit of a GPS receiver, or this should be contained to have formed the receiver stowage 26. By this, the antenna cable 18 for external shown in drawing 14 and drawing 15 can be abolished, and a compact and the GPS card 20 suitable for small and war KINGUNABI cheapness and handling are more easy and using PDA22 can be realized more. So that the radiation from the component and circuit, for example, CPU, of the PDA22 interior which comes through the inside of a card slot 24 may not interfere with reception of the satellite signal by the GPS antenna 32, if this description is told to a detail more By devising arrangement of the structure of the receiver stowage 26, and the GPS antenna 32 It is being able to position suitably, in spite of having contained the GPS antenna 32 to the receiver stowage 26 interior, and having enabled it to obtain navigation data from powering on etc. for a short time.

[0026] The receiver stowage 26 in this operation gestalt has the configuration which connected the circuit stowage 42 and the antenna stowage 44, as shown in drawing 1 . The circuit stowage 42 has contained the part which does not contain an interface 38 and the GPS antenna 32 including ASIC34, memory 36, and the accumulation-of-electricity component 40 among the circuits shown in drawing 3 to the interior. The antenna stowage 44 is a part which contains the GPS antenna 32 (in and the case a part of the circumference circuit).

[0027] The circuit stowage 42 and the antenna stowage 44 all have the tabular configuration, and as shown in drawing 4 and drawing 5 , they are mutually connected with the revolving shaft 46. The circuit stowage 42 is established in the end of the interface section 28 fixed, and the antenna stowage 44 is being fixed to

the circuit stowage 42 so that it may be revolved in this revolving shaft 46 as a core. The arc of the turn of the antenna stowage 44 is [ as opposed to / at this operation gestalt / the depth direction of a card slot 24 ] parallel. Moreover, a revolving shaft 46 can be used also for connecting electrically the terminals 50 on the circuit board 48 by which the GPS antenna 32 by which arrangement receipt is carried out, and the ASIC34 grade are carried in the antenna stowage 44 only as a shaft for making it circle in the antenna stowage 44 to the circuit stowage 42 (electric conduction pad etc.). That is, it can let the cable 52 for the electrical installation concerned pass by what the revolving shaft 46 is made hollow for. Although illustration is omitted, the circuit and the component on the circuit board 48 shall be connected to an interface 38 through the edge 54 of the circuit stowage 42.

[0028] Therefore, by making it circle in the antenna stowage 44, as it precedes using the function as a GPS receiver and is shown in drawing 5 , as shown in drawing 6 , it becomes possible to keep away the GPS antenna 32 from a card slot 24. Generally, since the reinforcement of an electromagnetic wave is in inverse proportion to the square of the distance from the source of radiation, it can reduce effectively the receiving reinforcement of the radiation from PDA22 in the GPS antenna 32 by keeping away from a card slot 24. Consequently, after powering on etc., since the frequency where a satellite signal is suitably receivable becomes high, when comparatively early, navigation data can be obtained. Furthermore, the above-mentioned amount of reduction changes with the size of the distance  $\Delta x$  in drawing 6 besides being the class, arrangement, etc. of the circuit and component in PDA22. Therefore, there is room which can reduce more the receiving reinforcement of the radiation from PDA22 in the GPS antenna 32 by the design of the location of the structure and the dimension of the antenna stowage 44, and a revolving shaft 46 etc. Furthermore, when there is no need for positioning, it can change into the compact condition that the antenna stowage 44 does not protrude as shown in drawing 4 . It can prevent stopping inconvenient [ of the handling accompanying the lug of the antenna stowage 44 ], and an external body's colliding with the antenna stowage 44, and breakage arising by this.

[0029] In addition, in case this invention is carried out, fields which are not parallel to the depth direction, such as a field which intersects perpendicularly with the depth direction of a card slot 24, can also be made into an arc of the turn. In order to contain the GPS antenna 32 formed thru/or fixed on the substrate, and ASIC34 mounted on the circuit board 48, since the circuit stowage 42 and the antenna stowage 44 become a configuration more near a plate, the way which made the arc

of the turn parallel to the depth direction is desirable. Moreover, you may make it prepare the hole for letting a cable 52 pass into parts other than revolving-shaft 46. Furthermore, it may be made to perform manually actuation made to shift to the condition which showed in drawing 4 from the condition shown in the actuation and drawing 5 which are made to shift to the condition which showed the antenna stowage 44 in drawing 5 from the condition shown in drawing 4 , and you may make it establish the device for carrying out automatic activation of this actuation according to the command from PDA22 grade. In addition, the circuit stowage 42 may be formed so that it may be revolved to the interface section 28. In this case, the antenna stowage 44 did not need to be connected possible [ revolution ] to the circuit stowage 42, and the former may be attached in the latter fixed. Furthermore, in drawing 4 and drawing 5 , the condition of having carried out insertion wearing of the GPS card 20 is shown in PDA22, and the thickness of the case of the internal structure of PDA22 and the interface section 28, the circuit stowage 42, and the antenna stowage 44 etc. is omitted on the occasion of the illustration for simplification.

[0030] The configuration of the GPS card 20 applied to the 2nd operation gestalt of this invention at drawing 7 thru/or drawing 9 is shown. This operation gestalt is characterized by arrangement of the GPS antenna 32 in the receiver stowage 26. That is, the GPS antenna 32 is the form where only the include angle theta inclined to the depth direction of a card slot 24, and is formed as shown in drawing 8 . Furthermore, the shielding plate 56 is formed that electromagnetic shielding of between the circuit board 48 and the GPS antenna 32, and PDA22 should be carried out. Connection between the circuit board 48 and the interface section 28 is made through the hole established in this shielding plate 56.

[0031] Therefore, in this operation gestalt, as shown in drawing 10 , after radiation by CPU in PDA22 etc. is able to weaken with the shielding plate 56 first, it arrives at the GPS antenna 32. However, as for the GPS antenna 32, only the include angle theta inclines like the above-mentioned. Directivity of the GPS antenna 32 is designed so that it may usually become the large directivity which is suitable in the direction of the front face of radiation from two or more GPS Satellites which are scattered all over empty and appear that a satellite signal should be received suitably (it becomes low receiving gain and needs about the electric wave which comes from a tooth back if it says conversely). Therefore, if the GPS antenna 32 is leaned like this operation gestalt, the high interest profit receive direction and low interest profit receive direction of the GPS antenna 32 will incline, and a low interest

profit receive direction will turn to the depth direction of a card slot 24. Consequently, it is not generated or is hard coming to generate that reception of the satellite signal by the GPS antenna 32 is checked by the radiation generated in CPU in PDA22 etc. In addition, what is necessary is just to consider as 30deg extent, for example, although an include angle theta is based also on the class and arrangement of each circuit and each component in PDA22. Moreover, the hand control of an include angle theta or a self-regulatory mechanism may be established.

[0032] Furthermore, it is used for the information machines and equipment of the pocket mold which PDA22, i.e., a user, grasps and uses by the GPS card 20 concerning this operation gestalt, carrying out insertion wearing. Leaning the high interest profit receive direction of the GPS antenna 32 does a desirable result, when realizing directivity suitable for the standard use posture of PDA22. Namely, the standard use posture of PDA22 is a posture in which a user grasps PDA22 single hand and looks at the screen of that display 30, as shown in drawing 11 , and PDA22 will be inclined in this posture. As a result of the inclination of the high interest profit receive direction of the GPS antenna 32 to PDA22 and the inclination of the grasping posture of PDA22 negating each other, the direction currently designed by the direction of a boresight of the GPS antenna 32, i.e., gain max, turns to the zenith or the direction near this. Therefore, the effectiveness of becoming the posture in which it is easy to receive the satellite signal from a GPS Satellite suitably in addition to the effectiveness that the receiving gain over radiation of CPU etc. can be reduced can also be acquired by setting up an include angle theta suitably.

[0033] Furthermore, in this operation gestalt, as shown in drawing 7 , the CCD camera stowage 58 is connected with the receiver stowage 26. It is performed in connection of the CCD camera stowage 58 to the receiver stowage 26 by the rotation support device 60 so that 180deg extent rotation of the CCD camera stowage 58 can be carried out, for example. The CCD camera stowage 58 has contained CCD camera 62 shown with the parenthesis in drawing 3 . Furthermore, it is possible to also mount the memory stick slot 64 shown with the parenthesis by drawing 3 in the CCD camera stowage 58.

[0034] Thus, by building CCD camera 62 into the GPS card 20, it becomes possible for a user to rotate CCD camera 62 if needed, and to photo a surrounding situation. Furthermore, since the information about a its present location etc. can be acquired by actuation of the GPS antenna 32 and ASIC34, it is possible to combine the image data obtained by CCD camera 62 and the positioning result concerned. For example, the lat/long of a its present location is made to superimpose on an image, as shown



in drawing 13 (a), and you may make it present the display in the screen of a display 30, and the storage in the PDA22 interior and transmission to the exterior which minded PHS etc. further. Or it replaces with making it superimpose on an image in this way, and you may make it add to the file concerning image data as a header. If it does in this way, since the image of the perimeter photoed while the user rotated the CCD camera stowage 58 suitably can be matched with the photography ground and display, preservation, etc. can be carried out, it faces and is convenient to arrange the photoed image or its data later.

[0035] Furthermore, the memory stick slot 64 is formed in the CCD camera stowage 58, and if it is made to carry out insertion wearing of the memory stick 66 which stored the name of a place corresponding to the lat/long of a its present location, and this etc. at this memory stick slot 64 suitably as shown in drawing 12 , in ASIC34, it will become possible to carry out automatic conversion of the lat/long obtained by positioning actuation at the name of a place. As it follows, for example, is shown in drawing 13 (b), it becomes possible to make the name of a place superimpose on the image acquired by photography, or to add the head which includes the name of a place in the file concerning image data. Furthermore, since insert-and-remove wearing into the memory stick slot 64 is possible for a memory stick 66, it can cope with it suitable for migration of a user etc. by exchanging a memory stick 66 if needed.

[0036] In addition, it is also possible to form CCD camera 62 in the 1st operation gestalt shown in drawing 1 etc.

---

## DESCRIPTION OF DRAWINGS

---

### [Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing the configuration and its use gestalt of the GPS card concerning the 1st operation gestalt of this invention.

[Drawing 2] It is drawing showing the example of the screen-display gestalt in PDA, and (a) is drawing showing the condition that (b) displayed the its present location for the condition of having displayed the map, on the map, respectively.

[Drawing 3] It is the block diagram showing the circuitry inside the GPS card in each operation gestalt of this invention.

[Drawing 4] It is drawing showing the condition of having folded up the antenna stowage in the 1st operation gestalt, and (a) is a plan and (b) is an A-A sectional view.

[Drawing 5] It is drawing showing the condition of having set in the 1st operation gestalt, and having circled in it and extended the antenna stowage, and (a) is a plan and especially (b) is a B-B sectional view.

[Drawing 6] It is drawing showing the radiation receiving gain reduction principle in the 1st operation gestalt, and especially (a) is the fragmentary sectional view showing the condition that (b) circles in it and extended the condition of having folded up the antenna stowage, respectively.

[Drawing 7] It is the front view showing the condition of having carried out insertion wearing of the GPS card concerning the 2nd operation gestalt of this invention at PDA.

[Drawing 8] It is a C-C sectional view in the condition of having carried out insertion wearing of the GPS card concerning the 2nd operation gestalt at PDA.

[Drawing 9] It is a side elevation in the condition of having carried out insertion wearing of the GPS card concerning the 2nd operation gestalt at PDA.

[Drawing 10] It is the fragmentary sectional view showing the radiation receiving gain reduction principle in the 2nd operation gestalt.

[Drawing 11] It is the side elevation showing the use gestalt of the GPS card concerning the 2nd operation gestalt.

[Drawing 12] It is the conceptual diagram showing the conversion to the name of a place from the LAT LONG using the information on a memory stick.

[Drawing 13] It is drawing showing an example of the image acquired in the 2nd operation gestalt, and especially (a) is the conceptual diagram showing the example which (b) changes [ example ] into the name of a place the example which indicated the LAT LONG by superposition, and indicates the LAT LONG by superposition, respectively.

[Drawing 14] It is the perspective view showing the configuration and its use gestalt of the GPS card in the former.

[Drawing 15] It is a conceptual diagram for explaining the conventional trouble.

[Description of Notations]

20 A GPS card, 22 PDA, 24 A card slot, 26 A receiver stowage, 28 The interface section, 30 A display, 32 A GPS antenna, 34ASIC, 38 An interface, 42 A circuit stowage, 44 An antenna stowage, 46 A revolving shaft, 52 A cable, 58 A CCD camera stowage, 60 A rotation support device, 62 A CCD camera, 64 Memory stick slot.